

STUDIES IN MALESIAN RUTACEAE

III*. *Melicope suberosa*, a new species and new generic record for the Malayan flora

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Abstract

The genus *Melicope*, previously believed not to be represented in the flora of Peninsular Malaysia, has been found, in the form of a new species, occurring in montane rainforest on the upper slopes of Gunung Ulu Kali, Genting Highlands, Pahang, in Malaysia. The only known locality, a densely wooded gully at 1550 m alt., is in the midst of a zone rapidly being cleared by bulldozing and two of the only five trees found have been felled. The new species, *M. suberosa* Stone, is apparently related to Bornean species of *Melicope*, particularly an as yet undescribed unifoliate species known from Mt. Kinabalu in Sabah. The addition of *Melicope* to the Malayan flora brings the number of Rutaceous genera known to occur in Peninsular Malaysia up to seventeen.

Introduction

The family Rutaceae as represented in Peninsular Malaysia was last revised in 1972 (Stone, 1972) with sixteen genera and 58 species known to occur in the area. Since that time, further work on the family by T.G. Hartley (1974, 1979, 1982) and myself (Stone, Lowry, Scora, and Jong 1973; Stone 1978a, 1978b) improved our understanding of the Malayan members of the family and resulted in several changes of name and descriptions of new taxa. Continuing field work in the Peninsula in recent years has widened our knowledge of the distribution of various taxa. The exploration of the summit areas of the Genting Highlands, along and just past the Selangor border in Pahang, with particular concentration on the flora of Gunung Ulu Kali, the fourth highest peak in Peninsular Malaysia (almost 1800 m) was recently summarized in a checklist of the flora (Stone, 1981). This flora was already known to include several endemic taxa (including another species, *Maclurodendron magnificum* Hartley, of the Rutaceae, which was only discovered a few years ago), and all indications were that further exploration would likely result in an increase in the number of species including novelties in various genera. This conclusion is demonstrated by the discovery documented here, which not only proves to be an undescribed species but, in addition, to be a representative of a genus hitherto unreported from Peninsular Malaysia. This genus, *Melicope* J.R. & G. Forst., has long ago been recorded from India (*M. indica* R. Wight), China, Taiwan, Borneo, Philippines, Okinawa, New Guinea, Australia, and various Pacific Islands.

As the genus *Melicope* is being revised currently by Hartley, along with the closely related genera such as *Euodia*, specimens of the new species described below were

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sent to Canberra for his examination. He has confirmed (*in litt.*) that the species belongs to *Melicope sensu stricto*, in the original sense of the Forsters and therefore also to the more restricted diagnosis which will be using in his restructuring of the generic division of the tribe *Zanthoxyleae*. Dr. Hartley has also indicated some relationships of the new species particularly to Bornean plants, as detailed below.

With the addition of *Melicope*, the Malayan flora now is known to possess members of 17 genera of Rutaceae.

RUTACEAE — *Zanthoxyleae* — *Euodiinae*

Melicope suberosa B.C. Stone, *sp. nov.*

Plate 1; Figures 1, 2.

Arbor parva erecta usque ad 10 m alta, ramis majoribus fragilibus oppositis, trunco usque ad 15 cm diametro, cortice crassiter rugososuberoso, partibus glabris floribus et innovationibus primo ephemeraliter minute sparseque puberulentis exceptis; foliis simplicibus oppositis integris ellipticis, petiolis ad 55 mm longis, laminis vulgo 10-15 cm longis, 4-8 cm latis (maxime ad 22 × 11 cm), tenue subcoriaceis, minute glanduloso-punctatis non-aromaticis, costa infra elevato, nervis 7-12-paribus; inflorescentiis axillaribus, 15-30 mm longis, pedunculo 10-20 mm longo, cymulis 3-4 congestibus trifloriferis; floribus pallide albo-viridibus, tetrameris; sepalis c. 1.3 mm longis deltoideis scarioso-marginatis, extus minute puberulentis; petalis imbricatis glandulosis, 4.3 mm longis, anguste ovatis, apice cucullato, extus subglabris vel minute sparseque puberulentis; staminibus 8 (in specimine viso infertilibus) inaequalibus albis glabris, filamentis 1-1.5 mm longis, antheris 0.75 mm longis connectivo dorso minute glanduloso, apice apiculato; disco albo, 1 mm alto; ovario 4-lobato, viridi, 1.4 mm lato, minute puberulento; stylo 1.25 mm longo, in parte dimidio inferiori minute puberulento; stigmatibus obscure 4-lobato-capitato; fructibus 4-lobatis, stellato-radiatis, ad 20 mm latis, folliculis ad 9 mm longis, 8 mm latis, 9 mm altis, uniseminatis, dehiscentibus; endocarpio cartilagineo glabro; seminibus ovoideis c. 7 mm longis, nitide nigris, endospermio albo.

Type: *Stone & Lowry 15338* (KLU, holo: isotypes A, BISH, BO, K, L, SING, etc.), from Ulu Kali, Pahang, Malaysia.

A small glabrous tree up to 10 m tall, the trunk straight, to c. 15 cm diameter, branched laxly above with opposite, elongated branches; innovations at first very minutely sparsely puberulent (hairs simple, clear, 0.15-0.1 mm long, densest on leaf margins) but quickly glabrate; bark of trunk and older branches becoming thickly rugose-corky, 2-8 mm thick (or more), spongy, light brown; bark of youngest branchlets 0.5 mm thick, pale tan, sparsely and coarsely fissured; inner bark green; only the youngest 1 or 2 internodes green and as yet not corky; wood white, very brittle; leafy branchlets mostly 3-9 mm diameter. *Leaves* opposite, simple, elliptic, the petioles to 5.5 cm long, but usually 1.5-3.5 cm long, 3.5 mm diameter, thickened at base and apex and there later becoming pale corky-barked, the rest remaining green, subterete, distally shallow-channelled above, not articulated, abscissing at the base; blade to about 22 × 11 cm but commonly smaller, usually 10-15 × 4-8 cm, acute or obtuse at apex and at base, thin and rather delicately coriaceous, rather rapidly wilting; margins entire to somewhat sinuous or shallowly irregularly crenate distally; upper surfaces medium-dark glossy green, lower surfaces paler apple-green, somewhat duller; glands pellucid or green but minute, numerous but not evident without a lens; midrib slightly raised or flat above, well raised beneath; main secondary nerves about 7 to 12 pairs, looped well within (3-5 mm) the margin; tertiary

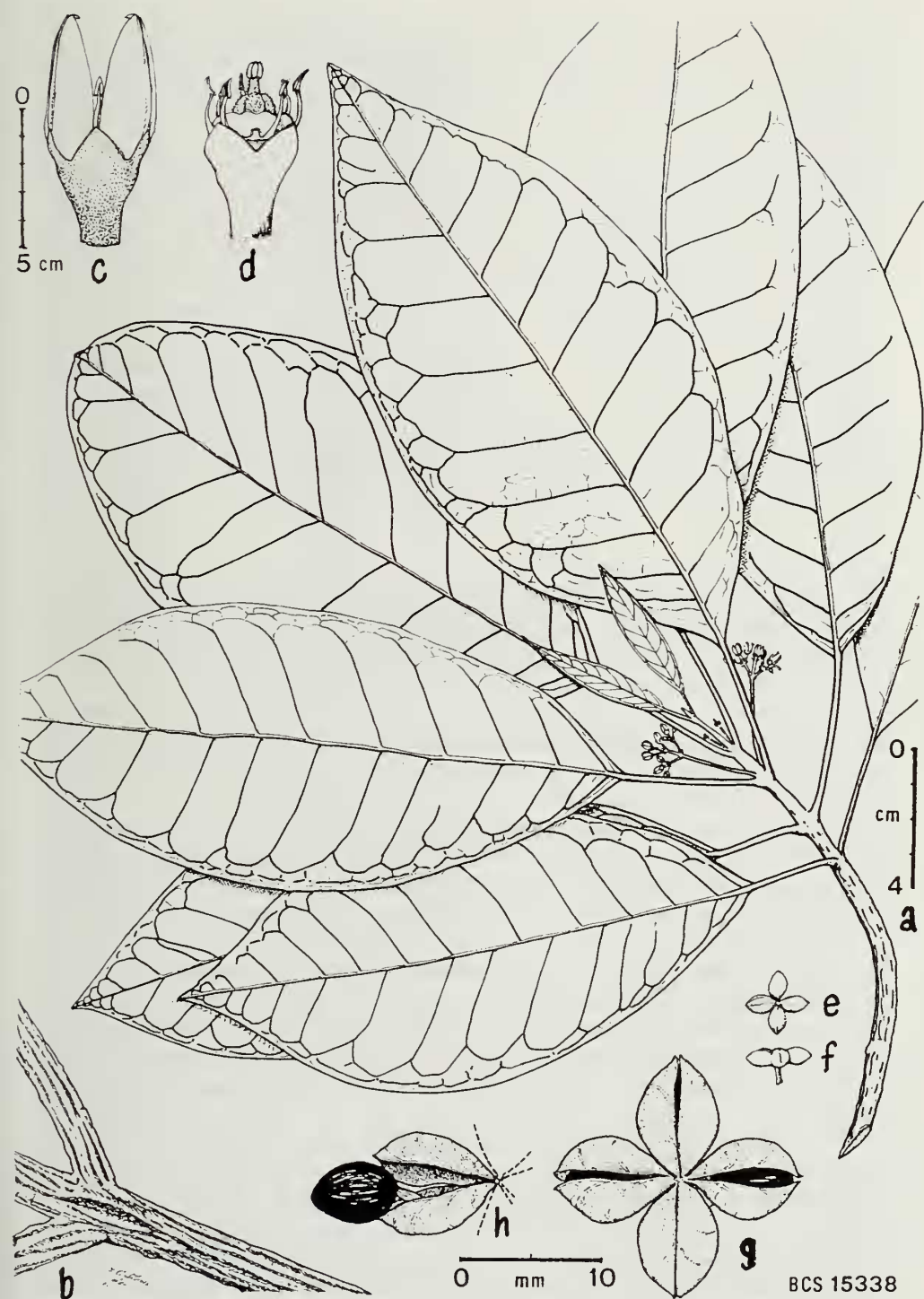


Fig. 1. *Melicope suberosa* B.C. Stone, sp. nov. Details of holotype — a: flowering branch; b: older branch showing rugose corky bark; c: functionally pistillate flower, side view; d: the same, with petals removed, stamens sterile; e: capsule in top view; f: capsule in side view; g: capsule in top view, enlarged; h: one ripe carpel with extruded seed. (From Stone 15338; b,e-f, to same scale as a.).

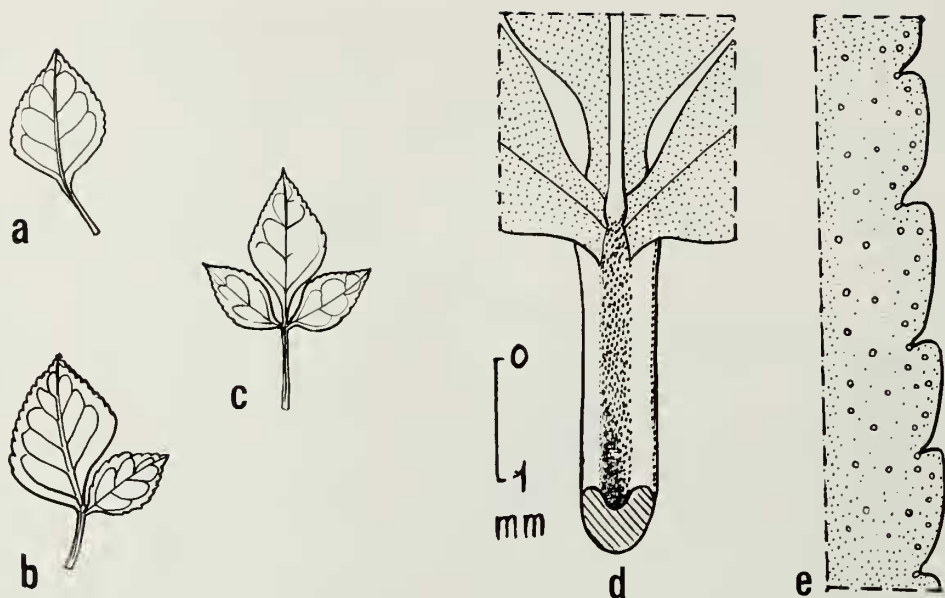


Fig. 2. *Melicope suberosa* B.C. Stone, *sp. nov.* Some details of the seedlings — *a*: simple leaf; *b*: bifoliate leaf; *c*: trifoliate leaf; *d*: petiole apex from the trifoliate leaf; *e*: leaflet, margin showing glands and crenulation. (From Stone 15349).

nerves and reticulations rather obscure in life, fine but evident *in sicco*; fresh blades very slightly scented on bruising.

Inflorescences axillary, pedunculate, up to 15-30 mm long, the peduncle somewhat compressed, 10-20 mm long, to 2.5 mm wide when fresh, channelled and somewhat shrunk when dry, subglabrous, but at first with minute and rather scattered conical 1-celled whitish hairs c. 0.1 mm long; bracts and bracteoles early caducous, c. 1 mm long, deltoid, scurfy; cymes congested, usually 3-flowered, or up to 3 or 4 partial cymes crowded near apex of inflorescence, with very short pedicels c. 1 mm long. Flowers greenish-white, the calyx about 2 mm high, the 4 deltoid lobes c. 1.3 mm long, green with pale or white scarious margins, minutely puberulent externally; petals 4, imbricate, folded, white tinged green, glandular, c. 4.3 mm long, narrowly ovate, the margins pale, the apex cucullate, glabrous within and subglabrous to minutely sparsely puberulent externally; staminodes in pistillate flower 8, glabrous, white, small, thin, with 4 slightly longer, anthers devoid of pollen, filaments 1-1.5 mm long, tapered, anthers 0.75 mm long, the connective dorsally with several small pale glands, the apex minutely apiculate; disk white, 1 mm high, slightly wider than the ovary; ovary 4-lobed, green, to 1.4 mm wide, minutely puberulent; style 1.25 mm long, pale green, puberulent in lower half; stigma pale, capitate but 4-lobed, minutely papillose, glabrous. Pedicels in fruit pale, corky, 3-4 mm long, 2.5 mm diameter. Fruits 4-lobed, or by abortion 3- to 1-lobed, dark green, radiate, dehiscent and turning brown, to 20 mm wide, each lobe ovoid, to 9 mm long, 8 mm wide, 9 mm tall, glabrate, glandular, 1-seeded. Endocarp thin, horny, glabrous, detaching. Seed ovoid, c. 7 mm long, testa thin, glossy black; endosperm white.

MALAYSIA: Pahang: Genting Highlands, Gunung Ulu Kali, 1550 m alt., below hotel complex in remnant patch of montane forest; small tree to 10 m tall, trunk and all branches with thick, rugose, softly corky bark and brittle wood; leaves all simple, opposite, as are the branches; flowering and fruiting simultaneously; 17 November 1982, *B.C. Stone & J.B. Lowry 15338* (KLU and to be distributed).

A very characteristic species. The most remarkable features are the thick, deeply corrugated but soft and corky bark, which is a light or medium brown and covers all the trunk and main branches and even twigs, except the youngest; and the uniformly simple, non-articulate leaves, which are very slightly undulate-subcrenate toward the tips, glossy on both sides, somewhat paler below, with rather conspicuous nerves. The leaves when crushed are only very slightly scented, and the fruit pericarp is also but faintly odorous. The capsular follicles dehisce, the seed is extruded but remains attached on its placenta, and the pericarp quickly withers and turns brown. Fruits with 1-4 ripening lobes are found, but the lobes seem to be uniformly 1-seeded. Only pistillate flowers were seen, and the number of staminodes was uniformly 8, with no fertile anthers even in the youngest buds examined. The minute hairs on the ovary are rather ephemeral and the fruits appear quite glabrous when ripe.

Ecology: Five or six apparently full-grown individuals were found, all close together in a moist, originally well-shaped gully with dense vegetation and granite boulders, at 1550 m altitude on the uppermost slopes of G. Ulu Kali (the location is about 50 m higher than the Sri Genting Villa, and is on the SE. side of the road leading up to the Genting Hotels complex). The gully is rich in bryophytes but lacks *Sphagnum*. Currently it is being cut, the upper end opened and the understorey now largely exposed to much more insolation than originally must have been the case. So far, this species has not been found elsewhere; this small gully population is clearly threatened. (Seeds, seedlings and cuttings have been taken for cultivation, and it is hoped to distribute this species widely). Fruiting was rather abundant in the population and ripe seeds were visible on most of the trees at the time of collection (November). In addition, there were numerous seedlings underneath, especially on the rich organic matter.

All the individuals found were pistillate; the flowers, though possessing stamens, do not produce pollen, the anthers being somewhat rudimentary. It seems possible that the seeds found, and perhaps the seedlings as well, are the result of a non-sexual process of reproduction. Further exploration is required in the hope of finding additional individuals and particularly to find staminate (or perhaps bisexual) individuals.

The canopy trees in the area include *Eugenia*, *Garcinia*, *Symingtonia*, *Lithocarpus*, *Litsea*, and various other genera (see Stone, 1981), forming a canopy about 18-26 m tall, i.e. about twice as tall as the *Melicope* trunks. It is clear that this species is essentially an understorey species of the primary montane forest, and seems not to be a pioneer or colonizer species like the *Euodias*. The very brittle, easily broken wood, and quick wilting character of the *Melicope* is very noticeable and somewhat unusual in this forest. Other members of the substorey stage which reach about the same dimensions as the *Melicope* are *Polyosma parviflora* King, *Prunus arborea* (Bl.) Kalkm., *Casearia capiteolata* Bl., and somewhat smaller shrubs include

Chasalia minor Ridl., *Pinanga polymorpha* Becc., and *Arthrophyllum stonei* Lim.

Relationships: The most similar species is one found on Mt. Kinabalu in Sabah, represented by *J. & M.S. Clemens* 51077, 51184, *G. Mikil* SAN 46579, *Chew, Corner & Stainton* 197, and *RSNB* 4547 and 4558. This species, as yet undescribed, has unifoliolate leaves. It differs from *M. suberosa* in having smaller flowers (with petals about 2.5 mm long), a glabrous perianth, and a glabrous gynoeceum. There are also on Mt. Kinabalu plants which are very similar, grading to a taxon with trifoliolate leaves (e.g. *J. & M.S. Clemens* 29810, 31048, 32562, 51052, *Carr* 27490, and *Stone* 11398). The latter taxon with trifoliolate leaves (represented by *J. & M.S. Clemens* 29477, 33623, *Carr* 27663, and *Ding Hou* 232) is in turn highly similar and may grade into a Sarawak taxon also with trifoliolate leaves (represented by *Sibat ak Luang* S. 22129 and *Banying ak Nyudong* S. 19031), which has smaller leaves, more delicate and longer inflorescences, and smaller fruits.

Amongst the already described species of *Melicope*, there do not appear to be any strikingly close to the new species. Some, such as *M. mindanaensis* Elmer, have unifoliolate leaves, but differ in important floral features. *M. indica* Wight differs in its more oboval leaves, pubescent stigma, and blunt anthers. *M. monophylla* Merr. differs in its hirsutulous branches, villous ovary, very short style and rugose cocci. *M. curranii* Merr. differs in its smaller flowers, oblong-obovate to oblong-lanceolate leaves, and very long petioles. *M. unifoliolata* Merr. and *M. helferi* Hook. fil., of Borneo and Burma respectively, are not true *Melicopes* and have been reduced to *Maclurodendron* by Hartley (1982). The others mostly have trifoliolate leaves, or differ in other important respects.

In Engler's treatment (1931) *Melicope* was subdivided into four sections, of which nowadays the last, *Tetractomia*, is best regarded as a well-defined genus of its own, as J.D. Hooker had originally ranked it. The other three are *Entoganum* (Banks ex Gaertn.) Engl., to which most of the species pertain; *Astorganthus* (Endl.) Engl., including only *M. simplex* A. Cunn. of New Zealand; and *Brombya* (F.v.Muell.) Engl. with only *M. platynema* (F.v.Muell.) Engl. of Queensland. The latter two are remote from the present new species.

Thus the relationships of *M. suberosa* appear so far to be with a complex of taxa, mostly undescribed, which occur in Borneo, especially on Mt. Kinabalu.

Seedlings: The seedlings of *Melicope suberosa* are noteworthy in that they occasionally produce some trifoliolate, or intermediate (bifoliolate) leaves. These seem always to be among the first four or five true leaves produced by the seedling. Later stages appear to have only simple leaves. These, as in the adult plants, are not articulated and can scarcely be called unifoliolate. Details of these seedling leaves are shown (Fig. 2).



Plate 1. *Melicope suberosa* B.C. Stone, **sp. nov.** *a*: leafy shoot with fruits. *b*: older stem, showing corky rugose bark. *c*: leafy stem with inflorescences; flowers at anthesis. *d*: ripe capsules. (All from the holotype; photographs by the author).

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